



## **Development and Energy in Africa (DEA)**

### **BRIEF PRESENTATION OF THE SITUATION & ENERGY POLICY OF MALI**

**By**

**Ibrahim TOGOLA**

**and**

**Pierre DEMBELE**

**Mali-Folkecenter (MFC)**

**October 2005**

## **Acknowledgements**

Malifolkecenter (MFC) is sincerely grateful to the Ministry of Energy for its active participation in the consultation process. Thanks also to the representatives from the various ministries, departments and agencies, the civil society and the private sector for their participation in this DEA presentation workshop. Our gratitude to the Risoe Centre of Denmark for initiating the present project which meets the pressing need of the countries in terms of energy projects' impacts evaluation. Special thanks to Mr Solomani DIAKITE, the National Director of Energy for his constant availability all along the data collection for the catalogue of interventions. It is worth to mention his availability even during non working days so that we can finish the work within the deadlines.

## Table of Contents

1	Introduction .....	- 4 -
2	Presentation of the Situation and Energy Policy in Mali .....	- 4 -
2.1	Introduction .....	- 4 -
2.3	Institutional Framework of the Energy Sector .....	- 6 -
2.4	Constraints and Potential of the Energy Sector in Mali.....	- 8 -
2.5	The Energy Policy of Mali .....	- 8 -
2.5	Strategic Framework to Fight Poverty and the Importance of Energy .....	- 10 -
	<p style="margin-left: 40px;">On May 29, 2002, the Government of the Republic of Mali, in collaboration with its development partners (World Bank, International Monetary Fund), adopted a Strategic Framework to Fight Poverty (CSLP), which defines the reference framework for all sectorial and multisectorial development programmes in Mali for the period 2002-2006. The objective of the CSLP is to reduce the incident rate of poverty from 63.8% in 2001 to 47.5% in 2006, and to ensure a Gross Domestic Product (GDP) growth of 6.7% on a period of 2002-2006.....</p>	
4	Consultations with the Main Actors of the Energy Sector .....	- 12 -
4.1	Meeting with the Director of DNE.....	- 12 -
4.2	Report of the DEA Workshop.....	- 12 -
4.2.1	Aim of the workshop: .....	- 12 -
4.2.2	Workshop' Agenda.....	- 12 -
4.3	Synthesis of Actors' Opinion and Recommendations of the Workshop.....	- 15 -
5	Catalogue of Interventions in the Energy Sector .....	- 15 -
6	Synthesis of developmental impacts of energy interventions .....	- 20 -
7	Conclusion .....	- 21 -
	Annex 1: Agenda of the First National Workshop of Mali .....	- 22 -
	Annex 2: List of Participants .....	- 23 -

## 1 Introduction

The DEA is a European Commission project within the framework of its COOPENER programme. It is co-financed by the Danish Government through the UNEP Risø Centre and the Dutch Government through the ECN. The project is carried out over a period of 30 months by European partners: Risø National Laboratory and Energy Centre Netherlands (ECN), and six Centres in 6 African countries namely: Botswana, Ghana, Mali, Senegal, Tanzania, and Zambia. The main objectives of project DEA are:

- To identify and evaluate the development impacts of energy initiatives
- To use the information to better design and improve future interventions in the energy sector

Within the DEA project activities' framework, three national Workshops have been scheduled. The present report, which is a summary of the energy situation and policy of Mali, was prepared for the first National Workshop held on October 12, 2005. The aim of the document is to develop a framework document for discussions during the workshop. The paper gives an overall picture of the energy situation of Mali and analyses the place of energy within the Strategic Framework to Fight Poverty (CSLP), which constitutes the reference framework of the development actions and policies of Mali over the period 2002-2006. The document also presents an overall picture of the catalogue of interventions in the energy sector, which was developed within the framework of the present project

## 2 Presentation of the Situation and Energy Policy in Mali

### 2.1 Introduction

Mali is a vast country located at the heart of West Africa. It lies between the 10<sup>th</sup> and 25<sup>th</sup> degree of the north latitude on one hand, and between the 4<sup>th</sup> degree of longitude East and the 12<sup>th</sup> degree of longitude West on the other side. It has an area of 1.241.231 km<sup>2</sup>. In 2003, the population of Mali was estimated to be 12 millions with more than 80% of this population living in rural area.

### 2.2 The Energy Situation of Mali.

Like many African countries, the energy situation of Mali is characterized by:

1. An over exploitation of the forestry resources.
2. Its dependence on imported petroleum products
3. The high cost of developing its abundant renewable energy potential.

In 2002, the total power consumption of Mali was 3,212,559 Tons of oil equivalent (Mtoe). This energy comes mainly from the biomass, petroleum products, electricity and renewable energies. The situation for the three main sub-sectors of the energy is as follows:



- **The biomass sub-sector**

The biomass primarily made up of wood fuel and its charcoal, occupies a central place in the national energy consumption of Mali (81%), then follow petroleum products (16%) and electricity (3%). The utilisation of renewable energies is currently insignificant.

The relative amount of biomass has decreased in energy assessments over the last years, because on the one hand, of the progression of petroleum products and electricity supply, and on the other hand the supply and demand controlled actions, carried out by the authorities and NGOs, with the support of development partners. In terms of figures, its progression was 2,354,000 Mtoe in 1997 to 2, 928, 300 Mtoe in 2000.

- **Hydrocarbons' sub-sector**

Landlocked and a non oil producing country, the supply of hydrocarbons is done through Côte d'Ivoire, Senegal, Benin and Togo. Supply through Lomé (Togo) and Cotonou (Benin) remains the most expensive way due to the long distance and transit difficulties. From 1994 to 2001, the importations doubled practically from 226,004 TM to 545,085 TM, that is to say an average progression of 17% per annum. For the year 2002, they amounted to 505,758 TM, i.e. an inherent fall from approximately 7% due to the prevailing political situation in Côte d'Ivoire.

- **Electricity sub-sector**

The electricity sub-sector is characterised as:

- In 2003 the rate of electrification was 13% as compared to 12 % in 2002. The same year, the access rates of the principal localities supplied with the inter-connected network were as follows: Kayes = 77%, Koulikoro = 45%, Bamako = 47%, Kati = 49 %, Fana = 60% and Ségou = 60%, and less than 1% for rural area. Electrification rate for the main urban cities is estimated for the 10 next years to be 63% as compared to 32% in 1998. For the same period, electricity supply in the rural area is expected to reach 16%, giving a national electrification rate of 25% in the year 2010.
- The national electricity system is composed of an inter-connected network as well as isolated centres. The total production was 631 GWh in 2003 as compared to 590 GWh in 2002. The hydro and thermal electricity supplies were respectively 83 % (524 GWh) and 17% (107 GWh). In June 2003 the total installed power was about 223 MW (including the Manantali two (2) groups of 40 MW). The peak power of the network is 98.43 MW.
- The annual average consumption of electric power is 524,886 kWh for medium voltage and 3,565 kWh for low voltage.
- In 2003, the number of subscribers increased by 10.29% as compared to the year 2002.
- The hydroelectric potential of the country (Niger and Senegal rivers, and their tributaries) is estimated at approximately 1050 MW (that is 5000 GWh available per annum) of which only 5% are currently exploited through the power stations of Sélingué, Sotuba and Férou. The hydroelectric power station of Sélingué is by far the most important power station of the country with a capacity of 44 MW and an annual energy production of 180 GWh.

- **Energy Uses in Mali**

The classification of the main sectors of energy utilisation in Mali, in a descending order of importance in the final energy consumption is as follows:

- households, about 86%, including 23% and 77% for urban and rural households respectively;
- Transport, nearly 10%, including 88% and 9% for road and air transport respectively;
- Industries, about 3%, of which half is made up of consumption from mining industries;
- Agriculture, less than 1%.

### **2.3 Institutional Framework of the Energy Sector**

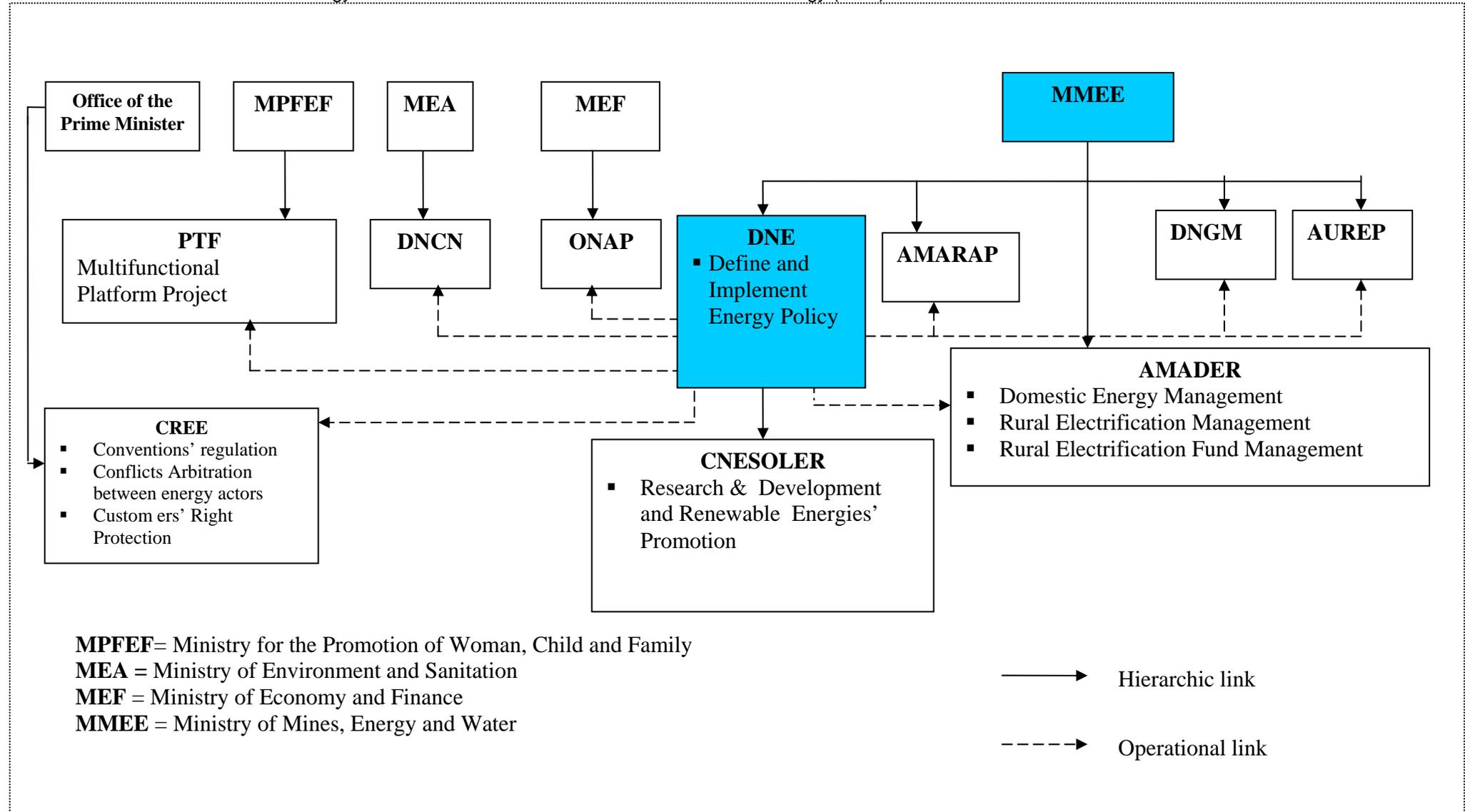
The energy sector in Mali is managed by four (4) ministerial departments (MMEE, MEF, MEA, MPFEF), three (3) central technical departments (DNE, DNGM, DNCN), one (1) service attached to DNE (CNESOLER), four (4) personalized services (ONAP, AMARAP, AMADER, AUREP) and one (1) autonomous and independent regulatory body (CREE). A consultative body called National Commission of Renewable Energies was created under the Minister of energy and is made up of the representatives of the public and private sectors.

This institutional dissemination of the general management of the energy sector can generate inconsistency risks and the scattering of efforts in the definition and implementation of energy policies.

In addition to the services mentioned above, some private companies ensure electricity public utilities services. The most important are: the Energy Company of Mali (EDM.SA) as a dealer, and two (2) Decentralised Services' Societies (SSD) acting with permission. There are many small private companies intervening in the sale of renewable energy equipments in general and solar energy in particular, as well as substitute fuels to wood and charcoal. There are also some socio-professional associations operating mainly in the electricity sub-sector. Also some NGOs contribute to the promotion of energy, particularly in the field of new and renewable energies.

Within a general framework, Mali also collaborates with Inter-Governmental Organisations (IGO) in Africa in the energy sector such as: OMVS, UEMOA, ECOWAS, AU.

The institutional framework of the energy sector and the role of the National Directorate of Energy (DNE) are summarised as follows:



## **Constraints and Potential of the Energy Sector in Mali**

The energy situation of Mali depends on constraining factors upon which the country does not have any control such as:

- The geographic location (landlocked) of the country and thus the long distances from the nearest maritime borders (more than 1000 km), hence resulting in an increase of the price of imported products and energy equipment;
- A vast territorial area (1,240.000 km<sup>2</sup>) coupled with a strong scattering of the human density;
- The fragility of the ecosystem due to precarious climatic conditions and the over exploitation of the forestry resources (household energy consumption accounts for about 90% of the national energy consumed. About 99% of the household energy is provided by wood fuel, whose consumption rises with more than 6 million tons/annum);
- The lack of non exploitable petroleum resources leading to the importation of all petroleum products to satisfy the energy requirement of the country.
- The evident insufficiency of the structures and local financing mechanisms;
- The weakness of the private sector;
- The weakness of the population purchasing power;
- An important national hydroelectric potential (more than 1000 MW) largely under exploited (25%);
- An enormous solar energy potential (5 to 7 kWh/m<sup>2</sup>/day) almost unexploited because of the high initial investment cost;
- An important biomass potential (32 million hectares of forest) over exploited (6,000,000 Tons or 400,000 ha/year);
- A modest wind power primarily concentrated in the sahelian and Saharan zones of the country (3 to 7 m/s of wind speed).

## **2.5 The Energy Policy of Mali**

The energy policy of the government is focussed around the following objectives and strategies:

### **General Objectives**

- To ensure that the greater number of the population has access to energy both in quantity and at low cost;
- To develop the national potential of renewable energy;
- To protect and preserve the existing wood fuel resources;
- To liberalize the sector by mobilizing more initiatives of the decentralized communities and private funds;
- To adapt institutions to the energy sector requirements through oriented capacities building, and the State strategic control.

### **Specifics Objectives**

The above general objectives are translated at the various sub-sectors of the energy by the following specific objectives.

- **In the sub-sector of Traditional or Domestic Energies**

The Domestic Energy Strategic launched in 1996, led to appreciable results although the situation still remains very alarming. The Government of Mali and its partners agreed to continue the project by widening the framework. The specific orientations as regards to traditional energy are:

- Reduction of wood energy demand (reduce the wood energy and charcoal wood by 20% from now to the year 2007), through the diffusion and improved stoves for kitchen, while contributing (as regard to economic conditions) to the promotion of butane and gas for cooking, the development of agricultural and plants residues as substitutes fuels;
- Progressive and adequate setting of the costs of woody fuels taking into account the economic value of the fuel for a better protection of forestry resources.
- Modernization of the supply and the marketing activities of wood fuels for heating, and the energy valorisation of plants and animal residues.

- **In the Hydrocarbons' sub-sector**

- Diversification of the country petroleum supply sources and access to the international market to improve the purchasing conditions and secure requirements;
- Design a petroleum products' consumption pattern as a development vector.

- **In the Electricity sub-sector**

- Increasing the electricity supply access rate to population from 8% in 1999 to 25% in 2007;
- Developing rural electrification for 1000 villages between now and the year 2007;
- Improving the management and performance capacities of Societies working for public service in the electricity sector;

- **In the sub-sector of Renewable Energies**

- Promote a large utilisation of renewable energy technologies and equipments in order to increase their contribution to the national energy assessment from now to 3% in 2007, and to 6% in 2010, 10 % in 2015 and 15 % in 2020;
- Create better sustainable conditions for renewable energies' services;
- Look for sustainable financing mechanisms suitable for renewable energies.

- **In the sub-sector of Nuclear Energy**

The development of passive nuclear energy application, through a reinforced cooperation with the International Atomic Energy Agency (IAEA) and the regulation of the utilisation of the related radioactive sources.

### **Strategic Orientation axis**

The energy policy of Mali and the plans of actions are centred on the points hereafter:

- Defining a long term development policy of the sector; including the economic and management aspects of energy.
- Continuing the institutional reform and the capacity building in the energy sector;

- Appropriate transfer of responsibilities to decentralised communities, particularly for the implementation and the maintenance of equipments and infrastructures;
- Improving production planning and control, as well as the exploitation and distribution of conventional and renewable energies;
- Continuing the liberalisation of the sector while mobilising more initiatives and private funds investments;
- Priority development of economically exploitable national energy resources, particularly the hydro-potential, solar energy, and biomass;

### **Strategic Framework to Fight Poverty and the Importance of Energy**

On May 29, 2002, the Government of the Republic of Mali, in collaboration with its development partners (World Bank, International Monetary Fund), adopted a Strategic Framework to Fight Poverty (CSLP), which defines the reference framework for all sectoral and multisectoral development programmes in Mali for the period 2002-2006. The objective of the CSLP is to reduce the incident rate of poverty from 63.8% in 2001 to 47.5% in 2006, and to ensure a Gross Domestic Product (GDP) growth of 6.7% on a period of 2002-2006.

The specific objectives are:

- In the health sector, a fall of child and maternal mortality rates;
- In the education sector, an increase in the schooling and elimination of illiteracy rates, together with a reduction in the inequality between boys and girls and among regions;
- In the employment sector, a significant reduction of the rate of unemployment and under employment.

The strategic directives of CSLP are:

1. To ensure institutional development and the improvement of governance and participation.
2. To develop human resources and the access to basic social services
3. To develop basic infrastructures and productive sectors

Energy has been identified (but in a very timid way) as a component that could really contribute to the economic growth necessary for the implementation of the CSLP objectives. Such a weak understanding of the role of energy is due to the low or lack of understanding of the complex relations between energy and the main objectives of the CSLP.

### **3 Situation and Regulatory Framework for Small and Medium Size Enterprises Development in the Energy Sector**

The government of the republic of Mali opted for the edification of a national economy based on free market economy. Thus, since 1982, the government disengaged the State from the productive sectors and limiting itself to its essential missions of sovereignty, regulation and protection of people and their goods.

In spite of the efforts carried out to improve the macro-economic situation and to reinforce the institutional, regulatory and legal framework, the private sector in Mali still remains confronted with structural, financial and organisational difficulties which make it inefficient.

To increase foreign investments' volume, and to ensure a real private sector development, the Government is focussing its efforts on the following points:

- To improve and to reinforce the dialogue between the State and the private sector
- To promote the creation of value added by supporting the emergence of competitive industries in the transformation of raw materials and local products
- To diversify and to develop the growing sources.
- To promote the creation of enterprise and to support the enterprises' development of in order to increase the role of the formal sector
- To support capacity building of support structures in the private sector and the development of human resources.

In the energy sector, the major actions considered by the Malian Government to attract private investors were the opening of the private sector to competition, the privatisation of the Energy Society of Mali and the development of a rural electrification programme.

The Government is convinced that the regulation of the electric energy sector in a liberalised environment will encourage the emergence of rural electrification by network and a decentralized rural electrification. The development and the implementation of projects and rural electrification programmes are therefore entrusted to local populations and authorities, as well as private businessmen with the support/advise of the State.

In 2000, it was therefore decided to privatise the Electricity Company within the framework of an agreement which transfers all investments relative to the electricity sector to the private.

In 2003, a rural electrification agency (AMADER) was set up. Its main objective is the electrification of rural area, particularly through the utilisation of renewable energies.

Two decentralised Services' Societies (SSD), and one Economic Grouping of Interest (GIE) also called "Yéelen Sô", were authorised to ensure public electricity utility services in a perimeter of 26 localities:

- the SSD in the Senegal River area was created in 1999 by EDF (Electricity of France) and Total-Fina-ELF. It has a 12 years' contract and has already electrified 4 villages out of the expected 5 in Kayes region;
- the SSD in the cotton belt was created by EDF and the Netherlands Society (NUON) in 1999. It has a 12 years' contract and has already electrified 17 villages out of the expected 52 villages;
- The GIE « Yéelen Sô » was authorised in 2002 to supply electric energy to the Kolokani locality before its electrification in 2005 by EDM Ltd, according to its investment programme.

There are other private businessmen particularly at Koro and Kéniéba who also are promoting public electrification utilities services without agreement.

To answer the difficulties facing the promoters of PME as regard to their access to traditional banking credit systems, the government is planning the following:

- creation of a Financial Guarantee Fund of the private sector;
- creation of a National Investment Fund;
- promoting the micro-finance;
- weaving of taxes on imported renewable energy equipments;
- subsidising butane gas is also an initiative of the government to encourage the use of butane as a substitute for wood and charcoal fuels. The subsidy is paid directly to the suppliers of gas, and may vary according to years. It applies to the 2.5 kg and 6 kg bottles.

In addition to a Rural Electrification Fund (FER), the government also grants subsidies to stakeholders to encourage them to develop rural electrification projects. The amount of the subsidy is 80% of the total cost of the project.

#### **4 Consultations with the Main Actors of the Energy Sector**

##### **4.1 Meeting with the Director of DNE**

From the very beginning, MFC felt the need to involve public authorities all along the project. Consequently, in developing the catalogue, several meetings took place with the National Director of Energy (Mr. Solomani DIAKITE), who is the focal point of the European Union Energy Initiative. The meetings were held every Wednesday and Saturday from July to August 2005. To ensure data quality, the consultation was limited to the Director of the DNE

However during the DEA presentation workshop held at “Hôtel Nord-Sud” on October 12, 2005, the framework of discussions was widely open to the different actors in the energy sector. A score of participants, coming from the Ministry of Energy, National Assembly, private sector, multi-sectoral committee of the European Union Energy Initiative follow-up, the CSLP coordinating committee, NGOs, and different enterprises working in the energy sector attended this important meeting.

##### **4.2 Report of the DEA Workshop**

Within the DEA project activities’ framework, three national workshops are expected to take place. The first consultation workshop was held at Hotel Nord-Sud, on October 12, 2005, gathering policy makers and other partners operating in the energy sector in Mali (see attendance list in appendix).

###### **4.2.1 Aim of the workshop:**

The objective of the workshop was to present the DEA project and to initiate a dialogue with the policy makers and other actors of the energy sector in order to collect their opinions on the place of energy in development, and to evaluate the energy needs for the country, in terms of follow-up and evaluation of energy projects’ impacts on the development as well as poverty reduction.

###### **4.2.2 Workshop’ Agenda**

Three short speeches marked the opening ceremony:

- The Director of Malifolkcenter, Dr. Ibrahimia TOGOLA, through a speech centred on the context of the workshop, welcomed the participants in a difficult fasting period.

- The Principal Private Secretary to the Minister of Mines, Energy and of Water, Mr. Souleymane DIALLO, stressed the place of energy in development projects and programmes in Mali. Within this framework he developed the concept of energy services, which comprises all the services rendered by the utilisation of energy. He then declared the workshop open.

After these short speeches, a steering committee was setup as follows:

Chairman: Mr. Fawaly KEITA (from the National Assembly Energy Commission)

Secretaries: Mr. Guru SANOGO (from CCA-ONG/GRAT), Mr. Pierre Dembélé (Malifolkecenter).

The day's agenda started with the introduction of participants followed by five (05) presentations:

**i. First communication**

The first speaker was Mr. Souleymane DIALLO, Principal Private Secretary of the Ministry of Mines, Energy and Water. His presentation was related to the place of energy in development, the Evaluation Methods, and the follow-up of energy projects' impacts in Mali. In his message he emphasized that energy can be used for various needs such as: water pumping, mechanization of agriculture, schools lighting, health centres, refrigeration for the conservation of food and drugs, and to stimulate development of various income generating activities etc. In concluding he drew the attention of participants on the fact that the best way of measuring energy impact on development is to undertake comparative studies.

**ii. Second communication**

The second speaker was Ms. Fatima DENTON from the Risø National Laboratory. In her speech, she introduced the DEA project, its objectives and the different Work Packages. The DEA Project is structured in eight Work Packages such as: the Project Management, Literature Review, establishment of a Catalogue of Energy Interventions, Consultation with National Policy Makers and Stakeholders intervening of the energy sector; all that in order to develop a preliminary evaluation tool which will be used for some case studies in the six targeted African countries. These case studies will make it possible to test and refine the evaluation tool which will finally be disseminated to the policy makers and other stakeholders of the energy sector during a regional workshop. To encourage the discussions with the participants, she raised the following questions:

**Specific questions related to projects' impacts and the policy process**

- Which type of information is useful for policy makers?
- How did we make use of successful projects' information or other?
- What is the value of information and its range in the policy formulation process?
- How to draw the attention of policy makers to this information?
- What is the decision-making process, and can we influence this process with relevant information?

**Questions relative to the evaluation tool**

- Could this evaluation tool help us to better formulate projects which will have impacts on the development?
- Could this type of project evaluation tool lead to more articulation between energy projects and the sectors?

### **General questions**

- What are the success criteria for an energy project whose strategic goal is human development?
- Can the sharing of information itself lead to a new vision in designing the problems?
- Doesn't the lack of communications between several initiatives reduce the potential impacts of development?
- Doesn't what is happening in the international environment limit decision-makers operating space?

### **iii. Third communication**

The third speaker was Hamata AG HANTAFAYE from the National Directorate of Energy, who characterized the energy situation in Mali by an over-exploitation of the forestry resources, a total dependence on imported petroleum products, and the high initial investment cost of renewable energy potential of the country. The general objectives of energy policy in Mali are to:

- Ensure to a greater number of the population access to energy and at low cost ;
- Develop the national energy resources' potential;
- Protect and keep the existing combustible resources;
- Liberalise the sector by mobilising more decentralised communities and private funds;
- Adapt institutions to the energy sector requirements, through strategic oriented capacity building and State control.

### **iv. Fourth communication**

The 4<sup>th</sup> speaker was Mr. Pierre Dembele from the Malifolkecenter. He introduced the Catalogue of interventions in the energy sector for the period 1999 – 2005, as well as the objectives and implementation of projects such as: the Domestic Energy Strategy (SED), Women' New and Renewable Energies' project (FENR), the Multifunctional Platform Project to Fight Poverty in Mali (PTF), Decentralised Services Societies (SSD), and the Agricultural Residues Energy Development Project.

### **v. Fifth communication**

The fifth communication was related to the place of energy in the CSLP. From this presentation it is recalled that the Strategic Framework to Fight Poverty in Mali, which is the reference framework of all development actions in the country has three large components. Energy is presented in the third component (but in a very timid way), as a strategy to achieve the goals of the CSLP. This weak perception of the role of energy drew the attention of participants. Unanimously they recognized the role of energy and the need for rewriting the CSLP and add energy as a priority component for both development and poverty reduction

After each presentation, explanation questions as well as contributions from participants were made. Discussions were focused on the following points:

- a. How can the lessons learned from the previous projects can be useful in improving the design of future projects
- b. How can the successes and weakness of projects can be taken into account in the formulation of development policies
- c. Indicators to measure the impacts of energy projects on development

- d. State Action to facilitate the involvement of private sector in evaluating the impacts and collection of information

#### **4.3 Synthesis of Actors' Opinion and Recommendations of the Workshop**

Following the above questionnaires and the different contributions, participants appreciated the DEA project initiative and then made the following recommendations.

- a) Actors agreed that energy is a stimulating component of the production, contrary to the luxury conception as understood by a greater portion of the population. Participants appreciated the DEA project initiative which aims at understanding the complex relations between energy projects and their impacts on development. Consequently they recommended the access to energy as a prime axis for development and poverty reduction action in Mali, therefore the need to sensitize the population on the relations between development and energy projects by making them understand that:
  - energy can contribute to food security through the mechanization of agriculture which can increase the production,
  - electrification of classrooms leads to better working conditions and can encourage the schooling of children, and yield a better exams' success rate,
  - electrification of health centres leads to better health conditions,
  - energy is used for the conservation of drugs,
  - energy is used for water pumping,
  - Energy can save time which can be then be used for income generating activities such as weaving, night sewing, gardening etc....
- b) As regard to the evaluation tool that will be developed within the framework of the DEA project, actors recognise that it is often difficult to ascribe changes to the implementation of a project due to the lack of previous data before the development of the project. They recommend that the evaluation tool takes into account such data constraint by coming out with measurable indicators.
- c) Very often there is a lack of qualified human resources to evaluate the impacts of energy projects on development. Participants considered the need to support the various actors intervening in the energy sector, through capacity building as regard to energy projects' impacts evaluation.
- d) Actors deplore the fact that some projects are justified by political interests and hence do not meet the real needs of the populations. This reduces projects' performances as well as equipments' sustainability. It is important to associate beneficiary populations in projects design and management so as to yield maximum benefit.
- e) Participants at the workshop highly recommended the continuation of dialogue all along the DEA project in order to take into account the various opinions in developing the project evaluation tool.

#### **5 Catalogue of Interventions in the Energy Sector**

A catalogue of interventions in the energy has been developed within the DEA project. The document includes ten (10) projects ending between 1999 and 2005. In general these are projects related to the protection of environment through the diffusion of energy saving equipments and substitute fuels to wood

and charcoal, or the utilisation of renewable energy systems for water pumping, refrigeration, cooking, rural milieu electrification, to satisfy the basic needs. A summary of the implementation of these projects are given below.

### **Multifunctional Platform Project to Fight Poverty (PTF)**

Mali was the first country in Africa where the concept of multifunctional platform was developed in collaboration with UNIDO/FIDA and UNDP. Today the project has been extended to 4 other African countries (Burkina-Faso, Guinea Conakry, Ivory Coast, and Senegal). At the beginning, the cereal mill was the principal element constituting the platform, and seemed adequate for the lightening of women tasks. But in the course of time, several constraints were detected. Hence, in order to propose innovative solutions with real positive impacts on the women' work and living conditions, the initial objectives were modified in the course of time.

During the period of research and development, the methodology was then modified according to the experiences on the ground with the villagers, as well as the results of technical research. Thus the cereal mill, which is generally composed of an engine and a mill, became a "platform" whose basic module is identical to the traditional mills; in addition to that, is added several innovations and additions of agricultural product transformation tools, as well as equipments for non agricultural activities (welding for instance), that are adapted, compatible, and powered by the same engine. Activities of the project were also diversified: training and promotion of private sectors directly related (mechanics, electricians, manufacturers, etc), service providers etc.

The multifunctional platform constitutes a suitable answer to reduce women energy poverty in rural area, and to encourage local development. By reducing the heavy work load upon women, it also gives them more time that can be devoted to education, children care, improving sanitary conditions, as well as additional incomes generation facilities.

### **Implementation of the PTF Project**

Implementation of the project led to:

- the installation of 501 platforms including 19 with water supply networks and 7 with lighting networks;
- the training of 233 literacy teachers in Bamanan and Soninke, Khassonké, Bobo, Peulh, and Dogon languages, etc. ;
- the training of 88 craftsmen as technicians for equipment installation
- the creation of 23 design offices
- the training of 941 millers
- the training of 3586 members of female committees' management
- the identification of 36 collaborative partner NGOs for the project.
- the creation of a website ([www.ptfm.net](http://www.ptfm.net)) to capitalise the induced effects and repercussions of the platforms.

### **Domestic Energy strategy (SED)**

The Domestic Energy Strategy results from the study led by ESMAP in 1992, on the energy sector of Mali. The study showed that the domestic energy sector is of great importance for Mali in comparison with the report hereafter:

- household energy consumption accounts for about 90% of the national energy balance, and come exclusively (about 99%) from traditional energy sources.
- wood-fuel energy consumption accounts for more than 6 million tons per annum, leading to several hundred of thousand square meters of deforestation, and as a result an increase of drought and desertification;

The project was implemented between 1996 and 2002, and the main objective was to contribute to the protection of the environment and fight against desertification while limiting the use of wood fuel to the real regenerative capacity of the forest. The first phase of the project was funded by a consortium composed of FGE, France (AFD/CFD), Germany (GTZ), the Government of Mali and the Netherlands through DGIS. The table below gives a summary of the main achievements of the project.

	<b>Projection</b>	<b>Achievement</b>	<b>Percentage of achievement</b>
Paraffin stove	17 000	10 047	59
Charcoal stoves	68 000	99 828	147 %
Development of SDA	Bamako, Segou, Koutiala, Niono, Mopti, Kayes	Bamako, Segou, Koutiala, Niono, Mopti,	83 %
Wood rural market	245	190	78 %
Developed forests (ha)	735 000	320 414	44 %
Diffused chimneys	400	100	25 %
Collection of dead wood	Data re- actualisation Study	Achieved	100 %

### **Women' New and Renewable Energies' Project (FENR)**

Women' New and Renewable Energies' project was the Malian Government's response to the questions raised during the International Conference on Renewable Energy held in Nairobi in 1981. The conference had strongly recommended the active implication of women in the decisions taking process in order to streamline the consumption of energy, as they are the main producers, users and managers of energy sources. The Project was implemented in two steps between 1992 and 2001: a pilot phase between 1992 and 1995, and an implementation phase between 1996 and 2001.

The WREP aimed at promoting and utilizing new and renewable energies through the installation of solar lighting systems, solar water heaters and dryers, as well as multifunctional platforms, using *Jatropha* oil. The project also aimed at training women groups for the utilisation of installed equipments and the management of the income generated. Partners of the project were: the UNDP, the Governments of Netherlands and Mali. The project was implemented by CENESOLER.

### Accomplishments of the FENR Project

Region	No. villages	No. Lightings	No. water-heaters	No. of dryers	No. of Wind mills	No. Platforms	Total RE
Koulikoro	40	33	19	09	-	-	63
Ségou	44	40	27	12 of which 02 semi-industrial	02	01	82
Sikasso	46	40	28	06	-	15	89
<b>Total</b>	<b>130</b>	<b>113</b>	<b>74</b>	<b>27</b>	<b>02</b>	<b>16</b> of which <b>03</b> with mechanical press	<b>232</b>

Region	No. of Trainees
Ségou	150 leaders
Sikasso	150 leaders
Koulikoro	175 leaders
Ségou, Sikasso, Koulikoro	60 local technicians
Ségou, Sikasso, Koulikoro	3,500 women who can read and write

### Decentralised Services' Society (SSD)

The implementation of the SSD falls within the framework of the reforms started in 1998 by the Malian Government in consultation with its development partners, in the electricity sector. It aims at developing rural electrification in specific zones in order to ensure to a greater number of the population access to electricity. Consequently, the Ministry for Mines, Energy and Water, authorized the creation of two Decentralised Services' Companies (SSD): the Decentralised Service Society river zone (region of Kayes) led by the group EDF-Total-Fina-Elf, and the "SSD-EN YEELEN-KURA" (Koutiala zone) managed by the EDF-NUON grouping.

### Accomplishment of the SSD Senegal River Zone

The **SSD Senegal River Zone provides electricity under the form of a mini network to Yélimané, Lakanguémou, Ambidédi Korè and Tambakara villages. A total of 625 families profits from these SSD.**

The SSD cotton zone has an installed capacity of 107 kW as per December 31, 2004. With such power, it can supply electricity to 1,373 customers in about thirty villages located in Koutiala area. That benefits more than 20,000 peoples, and constitutes approximately 4% of the total population of the intervention zone.

### **“BIOMASS MALI”: Agricultural Residues’ Energy Development**

The principal objective of Agricultural Residues’ Energy Development is the production of substitute fuels for wood and charcoal. "Biomass Mali Ltd" produces combustible briquettes by carbonization and agglomeration technique.

#### **Accomplishment of « BIOMASS-MALI »**

The advantages of "Biomass Mali" as regards to combustible briquettes’ production are:

- The installation of a manufacturing unit of combustible briquettes in Bamako having a production capacity of 600 kg per 8 hours.
- The installation of a production line with 5 agglomerations and 2 crushers.
- The manufacturing and marketing of more than 40 charcoal furnaces.
- The training of more than 60 people (including women’ association) to carbonisation techniques, at Falan, Koula, Kalfabougou and Djinina.
- The Production of several tens of tons of briquettes

#### **Other Projects in Process**

- The Domestic Energy Project and Access to basic services in rural area (PEDASB), was financed by the Government of Mali, the World Bank, the FEM, the Swedish Co-operation Agency, and the KFW. The total cost of the project was 64 million US dollars for a period of five (5) years. The objective of the project is to increase the rate of electrification in rural areas to 12% during the next five years (2005 - 2009) and to 80 % by 2020; to provide electricity utilities to 60,000 customers in urban neighbourhoods and rural areas; to set up approximately 500 community or institutional photovoltaic solar systems (for community services, health centres, photovoltaic water pumping, management); to set up approximately 10,000 individual domestic photovoltaic solar systems
- The Mini/Micro hydroelectric power stations, was financed by Mali, the UNDP and the ABD for an amount of 6.1 million US dollars to construct seven (7) power stations (447 kW) for a population of 17,000 persons.
- The solar photovoltaic equipment diffusion Programme was financed by Mali and India for a total cost of 3 million US dollars.
- The Jatropha plant development Programme,
- The Renewable Energy Project for Women’ Promotion, was financed by Mali and the UNDP for a total amount of 2 millions US dollars (solar kits’ diffusion, pumps and solar driers, etc.).
- The construction of the hydroelectric power station of Kénie, cost 100 millions
- The installation of thermal power stations (30 MW), for an amount of 25 millions Euros
- The Village Electrification Project by Solar Energy Systems (PEVES), launched in 2003 for a period of 4 years with a total cost of 1,685,494,000 F CFA, was financed by the Governments of Mali and India. with a future recipients’ contribution;
- The National Energy Diffusion Programme of the Jatropha plant (PNVEP), started in 2004 for a period of 5ans is financed by Mali (PSTE), for an amount of 1,016 millions US dollars.
- The Promotion of New and Renewable Energies for the Advance of Women (PENRAF), cost 1,395,000,000 F.CFA, and financed by Mali (PSTE Fund) and the UNDP. It was launched in 2004 for a five (5) years period;

- The PEDASB shutter Renewable Energies' Project, is being drafted for an amount of 3,2 millions US dollars, will be financed by the FEM, the Government of Mali and other financial partners as an operational support to the Energy Policy in Mali through the promotion of renewable energies' sub-sector;
- The CNESOLER support project over a 4 years' period for the development of national solar radiation and wind data maps, necessary to the optimum selection of these technologies.;
- The rehabilitation project of renewable energies' prototypes manufacturing machines of the CNESOLER, schedule over a period of 2 years;
- The creation of a national and/or sub-regional centre of excellence in the renewable energy sector.
- Creation of renewable energies' components manufacturing and assembly units for both national and sub-regional market;

## 6 Synthesis of developmental impacts of energy interventions

Intervention	Socio-economic impacts
Multifunctional Platform to Fight Poverty in Mali	<ul style="list-style-type: none"> <li>• One of the most important impacts of the platform is the time saving. It is estimated that for the only cereal transformation (millet, sorghum, maize), the cumulated time saved over a week per person is equivalent to one working day of eight (8) hours.</li> <li>• Sanitation improvement particularly through the distribution of drinking water and lighting of health centres.</li> <li>• The use of Jatropha oil as substitute fuel to Diesel can bring an average saving of 928,800 F.CFA per annum per platform.</li> <li>• The money value of Jatropha seeds is 55 F.CFA /kg, and the money value of the by-products is estimated at 40% of the value of seeds. These generated incomes by the platforms through the development of the plant contribute largely to the diversification of income sources and hence to fight poverty, as well as the increase in Gross Domestic Product.</li> </ul>
Domestic Energy Strategy	<ul style="list-style-type: none"> <li>• Saving of 65F.CFA/day, as regard to expenditures in combustibles.</li> <li>• Job creation for more than 565 local craftsmen within the framework of the improved stoves.</li> <li>• Improved stove made it possible to avoid the consumption of 404,631 tons of wood and emission of 2.8 million of tons of CO<sub>2</sub> during the period 1997-2000</li> <li>• The project also led to the development of more than 320,414 ha of forests.</li> </ul>
Women' New and Renewable Energies Project (FENR)	<ul style="list-style-type: none"> <li>• A solar water heating can save 20,880F.CFA per year. It is therefore estimated that the 74 water heaters installed by the project will lead to a saving of 23,176,800 F.CFA during their 15 years life period.</li> <li>• It is estimated that a water heater in women delivery centre will save 171 tons of wood over their lifetime period of 15 years, which is equivalent to 1,350,000 km<sup>2</sup> of forests.</li> </ul>

	<ul style="list-style-type: none"> <li>• The use of the multifunctional platform can save time for women, which can be used for other income generating activities such as gardening, dressmaking, etc.</li> <li>• The project also trained more than 475 facilitators and more than 60 maintenance technicians.</li> </ul>
Decentralised Services' Society	<ul style="list-style-type: none"> <li>• Inhabitants take inherent advantages due to the availability of electricity. Many income generating activities such as: dressmaking, sewage, etc. can be done during the night.</li> </ul>
BIOMASS MA LI : Development of Agricultural Residues' Energy	<ul style="list-style-type: none"> <li>• The sale of cotton plant stems and charcoal dusts constitutes an additional income source for peasants and charcoal retailers</li> <li>• The project contributes to the creation of jobs through the employment of ten people for the production of combustible briquettes.</li> <li>• The substitution of combustible briquettes from cotton plant stem to charcoal can avoid the massive cutting of wood.</li> </ul>

## 7 Conclusion

This paper reviewed the energy situation and policy of Mali, and the experiences of the interventions in the field of energy. It explains the impacts that energy interventions may have on the development. Moreover the development of the catalogue of interventions has shown the lack of previous data on the situation before the implementation of any project, any thing that could facilitate a real evaluation of the impacts of the project. From the analysis of the various projects in the catalogue, it can be seen that energy project impacts can be measured in terms of:

- time saving
- benefits made due to the substitution of traditional energy sources by modern energy sources
- creation of income generating activities
- job creation
- improving the living conditions of people
- improving access to drinking water
- improving of health conditions
- improving of schooling and elimination of illiteracy

Annex 1: Agenda of the First National Workshop of Mali



Energy & Development in Africa (DEA)  
 First National Workshop of Mali  
 Hôtel Nord Sud, Wednesday, October 12, 2005

<b>Plenary Session 1:</b>	
<b>8:30-9:00</b>	Welcome and sitting of invited guesses
<b>9:00-9:10</b>	Welcome Address of the Director of Malifolkecenter (Dr. Ibrahim Togola)
<b>9:10-9:30</b>	Welcome Address of the representative of the Ministry of Mines, Energy and Water (role of energy in development programmes and projects in Mali)
<b>9:30-10:00</b>	Energy Projects Evaluation Methods and Impacts' Follow up (Energy Sector Strategic Framework Follow up Committee)
<b>10:00-10:15</b>	Coffee Break
<b>Plenary Session 2:</b>	
<b>10:15-11:45</b>	DEA Introduction (Ms. Fatima Denton)
<b>11:45-11:00</b>	Energy situation and Policy Presentation) (Multisectoral Committee)
<b>11:00-11:15</b>	Catalogue Presentation (MFC)
<b>11:15-12:00</b>	Questions (MFC Facilitator)
<b>12:00-13:30</b>	Lunch Break
<b>13:30-14:00</b>	Place of Energy in the CSLP (Coordination Unit of CSLP)
<b>14:00-15:00</b>	Questions (MFC facilitator)
<b>15:00</b>	End of the Workshop

## Annex 2: List of Participants

No	Name and Surname	Position or representative structures	Telephone Email
1	COZIER Thierry	European Union Delegation Infrastructures Adviser	2222065/2222153 Thierry.cozier@cec.eu.int
2	BA Boubacar	National Investment Agency of Local Authorities (ANICT)	2224634
3	DENTON Fatima	UNEP, Risoe Centre	+4546775116
4	Hamata AG HANTAFAYE	DNE (National Directorate of Energy)	6989940/2226683
5	KANE Braïma	APCAM (Permanent Assembly of Chamber of Agriculture of Mali)	6120864
6	KASSAMBARA Bréhima	National Directorate of Energy	2224538
7	DIALLO Souleymane	Principal Private Secretary in the MMEE (Ministry of Mines, Energy and Water)	
8	TOGOLA Ibrahim	Mali Folkecenter	2200617/6742609
9	DOUBO Sadou	DNPF	2236729
10	DIAKITE Sagen	Sinergie-SA	2212722
11	SISSOKO Sountou Coumba	National Directorate of Industries	2225756
12	DOUCOURE Mamoutou	National Directorate of Hydraulic	2287177/6462060
13	Mme COULIBALY Thérèse SAMAKE	National Directorate of Local Authorities	2291512/6715263
14	TRAORE Seibou	APCAM (Permanent Assembly of Chamber of Agriculture of Mali)	6494139
15	SANOOGO N'Gouro	CCA-ONG/GRAT (Coordinating Committee of Associations and Non Governmental Organisations)	2294341/6718228
16	KEITA Fawaly	National Assembly (Parliament)	6799152
17	Ousmane S. SAMASSEKOU	Malian Association for New and Renewable Energies' Promotion and Environment Protection (AMPERE)	6730585/2720164
18	SIDIBE Ousmane	CCIM (Chamber of Commerce and Industry of Mali)	6781688/6162925
19	MAGASSA Mamadou	CSLP/MEF (Strategic Framework to Fight Poverty)	2238637/6741803
20	OUATTARA Ousmane	Mali Folkecenter	2200617/2200618
21	DEMBELE Pierre	Mali Folkecenter	2200617/6239780 pierredembele@yahoo.fr